JURNAL PENATAAN RUANG
Volume 20, Special Edition II, Agustus, 2025
Land, Transport, and Housing: Insights from Government and Society
P-ISSN 1907-4972 | E-ISSN 1907-4972
DOI: https://doi.org/10.12962/j2716179X.v20iII.5190

Determining Key Technical and Political Factors for TOD Implementation in Surabaya Through Delphi-Based Expert Consensus

Anastasya Sabrina Rahmawati[1], Siti Nurlaela[✉2], I Dewa Made Frendika Septanaya[3]

[123]Urban and Regional Planning Department, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

Diunggah: 16/06/2025 | Direview: 04/07/2025 | Diterima: 09/07/2025

✉nurlaela@its.ac.id

Abstract: Transit-Oriented Development (TOD) planning in Surabaya requires a comprehensive understanding of the strategic factors that influence its successful implementation. This study aims to identify both technical and political factors that must be considered in TOD implementation. This study applies a Delphi method involving six stakeholders from government, academia, and NGOs to identify strategic variables influencing TOD. Technical variables are assessed using 7D principles (Density, Diversity, Design, Destination Accessibility, Distance to Transit, Demand Management, and Demography) aligned with national regulations (Ministry of Agrarian Affairs and Spatial Planning Regulation No. 16/2017), while political factors cover institutional governance, regulations, and financing. Of the 43 sub-variables evaluated, most reached unanimous (full) consensus and two attained majority consensus. The findings highlight that TOD success in Surabaya depends not only on technical compliance but also on institutional coordination and policy responsiveness to local context.

Keywords: Transit Oriented Development (TOD); 7D Framework; Delphi Method; Institutional Governance; Urban Policy

1. Background

The rapid development of urban areas in many developing countries, including Indonesia, has led to various complex problems such as population growth, traffic congestion, limited accessibility, inefficient land use, urban sprawl, and environmental pressures that accelerate climate change. These issues have gained global concern and are projected to reach a critical point by 2050 (United Nations, 2018; Dirgahayani et al., 2020).

Transit-Oriented Development (TOD) is considered a viable response that accommodates urban needs while addressing these externalities that coined by Calthorpe (1993). TOD planning integrates mixed land use around public transportation nodes, incorporating non-motorized modes such as walking and cycling to reduce dependency on private vehicles and mitigate traffic congestion (Cervero, 2004; Singh, 2015; Salat & Ollivier, 2017; Hendrigan, 2020; Wang et al., 2023). By developing transportation nodes, TOD not only enhances public transit ridership but also has the potential to increase property values in surrounding areas (Ibraeva et al., 2020).

Despite its potential to address urban complexities, the successful implementation of TOD remains limited, particularly in developing countries (Hendrigan, 2020). Unsuccessful TOD projects indicate a city's lack of readiness and preparedness, driven by factors such as high infrastructure costs, incompatible area characteristics, insufficient institutional coordination and collaboration, inconsistent policies and regulations, and lack of incentive schemes to attract private stakeholders to support TOD implementation (Belzer & Autler, 2002; Dittmar et al., 2004; Newton, 2010; Suzuki et al., 2013; Abdi et al., 2022). Transit Cooperative Research Program (2004) identifies three primary barriers to TOD implementation, including financial, political, and organizational challenges. These barriers underline the importance of of further investigation into the political factors that must be considered to support TOD implementation.

Surabaya was selected for a case study. It is the second-largest metropolitan area in Indonesia, characterized by rapid spatial growth and complex urban dynamics. The expansion has significantly increased the movement of people and goods, contributing to severe traffic congestion driven by the predominance of private vehicle usage. In response, since 2018 the Surabaya City Government has introduced the *Suroboyo Bus* system to improve urban mobility. To enhance public transport efficiency, urban development should be supported by integrated land-use and transportation strategies, especially through the implementation of TOD principles (Cervero, 2004; Dittmar & Ohland, 2004; Handayeni & Ariastita, 2014; Ayuningtias & Karmilah, 2019).

The Surabaya City Government has begun planning for TOD-based development, recognizing the city's strategic role as the provincial capital of East Java and its susceptibility to urban sprawl (Fatmawati, 2022). Although the term "Transit Oriented Development" has not yet been explicitly adopted in planning, sectoral, or regulatory documents, the *Surabaya Smart City Master Plan* as stipulated in Mayor's Decree No. 100.3.3.3/282/436.1.2/2023 indicates a plan and strategy to transform terminal areas into TOD-based development zones.

The successful implementation of TOD in various countries has provided valuable insights for developing cities like Surabaya in addressing traffic congestion and mobility system integration issues. Prior studies on TOD implementation have primarily focused on technical factors related to land suitability around transit nodes using the "3D" components (Density, Diversity, Design) (Curtis, 2012; Supaprasert et al., 2021; Ahmad et al., 2022). Similar studies in Surabaya by Handayeni & Ariastita (2014), Nurlaela et al. (2019), Nadyla & Nurlaela (2019), Az-zahra (2020), Masyithah et al. (2021), Fatmawati (2022), Mudzaki et al. (2023) also assess the spatial alignment of TOD indicators. However, studies determining the political factors influencing TOD implementation remain limited, especially within the Surabaya context. Thus, this study aims to identify strategic factors influencing TOD implementation, encompassing both technical components and political aspects. Through a multi-stakeholder approach, this research aims to bridge the gap in the literature, which has primarily focused only on technical aspects.

2. Factors Influencing Transit Oriented Development (TOD) Implementation

The implementation of Transit Oriented Development (TOD) is a strategic approach in urban planning that aims to integrate land use with public transportation systems. In many developing cities, including those in Indonesia, TOD development has primarily focused on technical aspects such as density, land-use diversity, urban design, transit accessibility, and spatial regulatory compliance, particularly in accordance with Ministerial Regulation ATR/BPN No. 16/2017. However, successful TOD implementation also requires strong institutional governance, cross-sectoral policy synchronization, and clarity in funding and financing mechanisms.

This study examines technical aspects using the 7D principles (Density, Diversity, Design, Destination Accessibility, Distance to Transit, Demand Management, and Demography) introduced by Cervero & Kockelman (1997) and Ewing & Cervero (2010), which are aligned with Ministerial Regulation ATR/BPN No. 16/2017. Meanwhile, political factors encompass institutional governance, policy frameworks, and financial mechanisms, which serve as critical determinants influencing TOD success or failure.

The development of Transit-Oriented Development (TOD) areas is a complex and cross-sectoral process involving multiple stakeholders with diverse perceptions, goals, resources, and strategies (Mu & de Jong, 2016; Ollivier et al., 2021). This complexity necessitates dedicated institutional arrangements to coordinate interests and manage inter-organizational interactions effectively (Cervero & Dai, 2014). Adaptive governance strategies, integrated policy instruments, cross-sectoral collaboration, and shared commitment are essential to align objectives, foster communication, and distribute responsibilities equitably without overburdening any institution (Alexander, 2007; Curtis et al., 2009; Curtis, 2012; Mu & de Jong, 2016; Rosalin et al., 2019).

Regulations are integral to TOD implementation, encompassing institutional structures and technical criteria such as TOD area classifications and financing schemes. Two key policies must be integrated for TOD success including land use and transportation (Dunphy et al., 2003; Greenberg, 2004; Bajracharya et al., 2005; Rosalin et al., 2019; Roberts et al., 2019), including zoning regulations and building intensity, mixed-use land development, and

parking area restrictions in order to encourage public transport usage (Greenberg, 2004; Gabbe et al. 2021; Bhagwati & Kumar, 2024). Political factors influencing TOD success include policy consistency, stable long-term vision, political stability, and government support, such as transportation taxation and infrastructure investment (Thomas & Bertolini, 2014; Thomas et al., 2018; PT. Sarana Multi Infrastruktur, 2019).

Zoning strategies must be supported by policies, investments, and well-designed incentives (Renne, 2008; Dorsey & Mulder, 2013). Incentive mechanisms play a key role in overcoming implementation barriers (Clark & Wilson, 1961; Roseland, 2005; Bajracharya et al., 2005; Newman in Curtis, 2009; Anderson & Forbes, 2011; Tan et al., 2011). Financing is closely tied to institutional, socio-political, and economic contexts, influencing TOD viability. Transparent cost structures, funding sources, and financial policy frameworks aid decision-makers in assessing risks and directing project strategies (WSP, 2020). Many TOD projects face financial barriers that cannot be easily resolved through traditional funding models (Center for Transit-Oriented Development, 2008). Besides the urgency of institutions and regulations, the clarity of the financial framework, including funding sources and the determination of financing schemes, is also key to the successful implementation of TOD (Bhagwati & Kumar, 2024).

Political factors play an important role as institutional prerequisites for enabling effective technical implementation. The absence of political commitment, weak institutional coordination, and limited public financing instruments are the main causes of stagnation or even failure of TOD planning in many regions.

3. Methods

3.1. Data Collection

Data collection in this study was conducted through a primary approach, comprising the distribution of semi-structured questionnaires and in-depth interviews with representatives from various stakeholder groups at the local level. These stakeholders consist of government agencies, academia, and non-governmental organization specializing in urban infrastructure, transportation, and spatial planning. The questionnaire and interview instruments were designed to explore stakeholder perspectives on critical variables influencing TOD implementation in Surabaya. Open-ended questions were developed based on a literature review that identified key factors in TOD implementation, with the aim of obtaining deeper insight into the rationale behind respondents' agreement or disagreement regarding the importance of each variable.

3.2. Research Variables

This study identifies a comprehensive set of variables derived from both technical and political aspects. Table 1 presents a synthesis of research variables compiled from various previous literature.

Table 1 Research Variable Synthesis

Indicator	Variable	Sub-Variable	Source
Technical Variables			
Site Characteristics	*Density*	Building Coverage Ratio (BCR)	Cervero & Kockelman (1997); Permen ATR/BPN No. 16 Tahun 2017)
		Floor Area Ratio (FAR)	
		Number of Floors	
		Housing Types	
		Minimum Residential Density	
		Targeted Number of Housing Units	
		Density Pattern	
	Diversity	Land Use Types	
		Residential and Non-Residential Ratio	
		Economic Activities	

Indicator	Variable	Sub-Variable	Source
	Design	Street frontage	
		Minimum Open Space	
		Block Dimension	
		Street Network Pattern	
	Destination Accessibility	Availability of Public Transport	Ewing & Cervero (2010); Permen ATR No. 16 Tahun 2017)
	Distance to Transit	Distance to Transit Nodes	
	Demand Management	Maximum Parking for Residential Uses	Ewing & Cervero (2010); Gruyter et al. (2020); Permen ATR/BPN (No. 16 Tahun 2017)
		Maximum Parking for Office Uses	
		Maximum Ground Floor Parking	
		Parking Pattern	
		Park and Ride Facilities	
	Demography	Population Density	
		Employment Density	
Political Variables			
Institutional Governance	Multidisciplinary Institutional	Lead institution (Full power)	Cervero & Dai (2014); Mu & Jong (2016); Thomas & Bertolini (2017); Thomas et al. (2018)
	Inter-actor Collaboration and Cooperation	Trade-off of Interests	Alexander, (2007); Curtis et al. (2009); Curtis (2012); Mu & De Jong (2016); Rosalin (2019); Moon et al. (2021); Hickman et al. (2021); Hasibuan & Mulyani, (2022); Hrelja et al. (2022); Müller (2024)
		Multi-sector, multi-level engagement	
	Political Stability	Policy Consistency *(Political Will)*	Thomas & Bertolini (2017); Thomas et al. (2018)
	Public Participation	Participation in Planning Process	Freire (1970); Thomas & Bertolini (2017); Thomas et al. (2018); Riyanto & Kovalenko (2023)
		Participation in Implementation	
		Participation in Monitoring and Evaluation	
Policy and Regulation	Instruments for aligning actors' roles and authorities	-	Bouckaert et al. (2010)
	Policy Integration (Land Use & Transport)	-	Dunphy et al. (2003); Greenberg (2004); Bajracharya et al (2005); Rosalin et al, (2019); Roberts et al. (2019); Kidokoro (2020)
	Policy Consistency	-	Thomas & Bertolini (2014); Thomas et al. (2018); PT. Sarana Multi Infrastruktur (2019)
	Incentive and Disincentive Schemes	Incentive	Clark & Wilson (1961); Roseland (1998); Ostrom et al. (1993); Bajracharya et al. (2005); Renne (2008); Tan et al (2011); Tan et al (2013)
		Disincentive	
	Zoning Regulations around Transit Areas	-	Gorowitz (2007); Kidokoro (2020); Gabbe et al (2021); Bhagwati & Kumar (2024)
Funding and Financing	Funding Sources	-	Metha (2018); Rosalin (2019); Bhagwati & Kumar (2024)
	Financing Models	-	

3.3. Data Analysis

The study employed a multi-stakeholder approach using the Delphi method. The Delphi method is a consultative and iterative process that involves systematic interaction between researchers and expert panels to reach a consensus on specific issues or to formulate strategic needs (Witkins, 1984; Adiyatma & Heliati, 2018). The analysis began by identifying stakeholders with relevant roles, interests, and influence in TOD development. Initially, the researchers confirmed the willingness to participate, as well as the responsibilities and authority of

nine prospective stakeholders from different institutions, but three declined due to limited expertise in TOD, resulting in six stakeholders actively contributing to the study (Table 2).

Among the six stakeholders, four represent government institutions with direct strategic influence on TOD implementation in Surabaya. The remaining two stakeholders include academics and representatives from non-governmental organizations (NGOs) with theoretical knowledge and practical experience in TOD, urban transportation, and spatial planning. This combination of actors was expected to provide a comprehensive perspective from both policy insight and practical implementation, contributing to a well-rounded understanding of ideal TOD implementation.

The first Delphi round explored stakeholder agreement and recommendations regarding the technical and political variables essential for TOD implementation in Surabaya, based on previously identified factors.

Table 2 List of Expert Respondents

No.	Institution		Field of Expertise
1.	Regional Development Planning, Research, and Innovation Agency of Surabaya City (Bappedalitbang)	Urban Infrastructure and Spatial Planning	Responsible for regional development planning, policy research, and integration of TOD principles into urban planning documents.
2.	Department of Transportation, Surabaya City (Dinas Perhubungan)	Public Transport Planning and Development	Oversees planning and management of urban transportation systems, ensures multimodal integration (bus, tram, paratransit, and *non-motorized transportation*), and optimizes public transport nodes.
3.	Department of Housing, Settlement Areas, and Land Affairs (DPRKPP), Surabaya City	Urban Spatial Planning	Manages residential spatial arrangements, building regulations, and urban area development in alignment with TOD principles.
4.	Department of Water Resources and Highways (DSDABM), Surabaya City	Roads and Bridges	Plans infrastructure supporting mobility and accessibility, particularly physical connectivity across zones and non-motorized transport (pedestrian, cycling).
5.	Academia, Institut Teknologi Sepuluh Nopember	Urban and Regional Planning Department	Provides academic and critical perspectives on TOD implementation, grounded in theory and contextual urban planning knowledge.
6.	Institute for Transportation and Development Policy (ITDP)	Transport and Urban Planning Associate	Focuses on sustainable urban transport development and TOD advocacy through technical expertise and international best practices.

A variable is considered to have reached consensus when the majority or all stakeholders provide same responses, either agreeing or disagreeing on its significance for TOD implementation in Surabaya. Non-consensus variables, where stakeholder opinions diverge, require iterative rounds until majority or full consensus is achieved. Additionally, relevant new variables may emerge through stakeholder discussions. The final Delphi results were synthesized to identify variables that achieved consensus, either through unanimous or majority agreement and which did not (Figure 1).

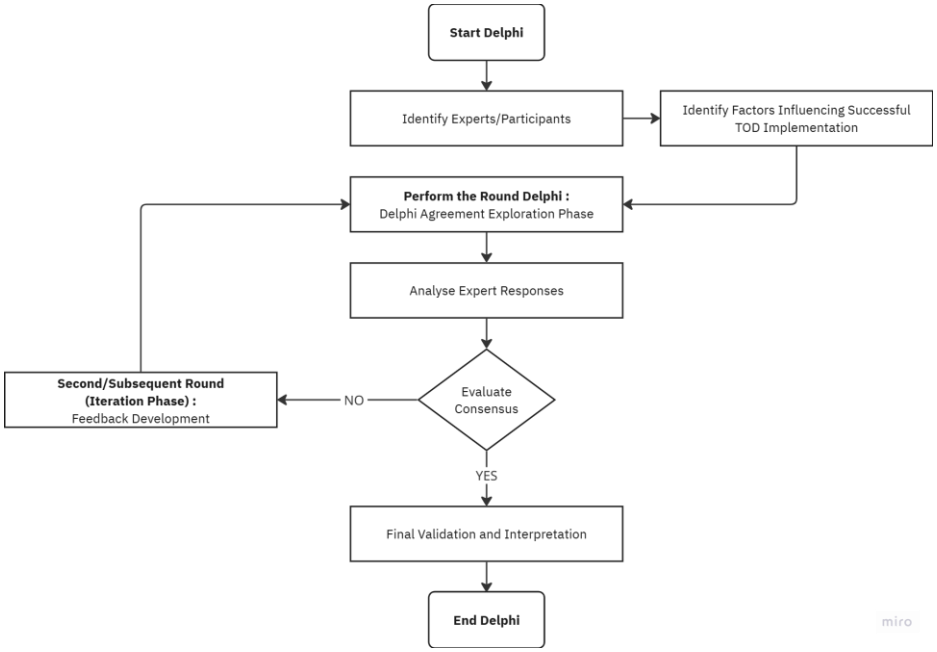

Figure 1 Analysis Flowchart

During iterations, responses from all stakeholders were anonymized to reduce bias and maintain objectivity (Plessis & Human, 2007; Humphrey-Murto et al., 2017; Tack et al., 2017). The responses were analyzed using frequency-based statistical methods through IBM SPSS software to identify patterns and measure the level of consensus. The following formula was applied:

$$M = \frac{x}{n} x\ 100$$

Where *M* represents the percentage of participants in agreement, *x* indicates the number of participants who agreed for each variable, and *n* denotes the total number of participants. Iteration did not aim to force unanimous or full consensus, but rather to reach a majority consensus based on response stability or the absence of significant changes in individual judgments across rounds (Humphrey-Murto et al., 2017), defined as more than half of participants agreeing (M ≥ 50%), if M < 50%, it is assumed to be non-consensus. In this study, the Delphi process concluded after the second round, as the majority of stakeholders maintained consistent responses without indicating any changes in their responses.

4. Result and Analysis

The Delphi analysis aims to achieve stakeholder consensus on critical variables affecting TOD implementation in Surabaya. A total of six stakeholders participated in in-depth interviews, assessing agreement or disagreement on variables and sub-variables identified through prior literature. This study examines four key indicators, encompassing 18 variables and 25 sub-variables.

4.1. Delphi Agreement Exploration Phase

In the initial exploration phase, stakeholders responded with either agreement or disagreement regarding the significance of each variable. These responses were compiled and presented for further deliberation in the second Delphi round. Table 2 summarizes the stakeholder responses.

Table 2 Level of Consensus and Level of Agreement for Influential Variables

Indicator	Variable	Sub-Variable	Agreed		Disagreed		Conclusion
			f	%	f	%	
Technical Variables							
Site Characteristics	*Density*	Building Coverage Ratio (BCR)	6	100%	0	0	Full Consensus
		Floor Area Ratio (FAR)	5	83,3%	1	16,7%	Majority Consensus (Iteration)
		Number of Floors	6	100%	0	0	Full Consensus
		Housing Types	5	83,3%	1	16,7%	Majority Consensus (Iteration)
		Minimum Residential Density	6	100%	0	0	Full Consensus
		Targeted Number of Housing Units	6	100%	0	0	Full Consensus
	Diversity Diversity	Density Pattern	6	100%	0	0	Full Consensus
		Land Use Types	6	100%	0	0	Full Consensus
		Residential and Non-Residential Ratio	6	100%	0	0	Full Consensus
	Design Design	Economic Activities	6	100%	0	0	Full Consensus
		Street frontage	6	100%	0	0	Full Consensus
		Minimum Open Space	6	100%	0	0	Full Consensus
		Block Dimension	6	100%	0	0	Full Consensus
	Destination Accessibility	Street Network Pattern	6	100%	0	0	Full Consensus
	Destination Accessibility	Availability of Public Transport	6	100%	0	0	Full Consensus
	Distance to Transit Demand Management	Distance to Transit Nodes	6	100%	0	0	Full Consensus
		Maximum Parking for Residential Uses	6	100%	0	0	Full Consensus
		Maximum Parking for Office Uses	6	100%	0	0	Full Consensus
		Maximum Ground Floor Parking	6	100%	0	0	Full Consensus
		Parking Pattern	5	83,3%	1	16,7%	Majority Consensus (Iteration)
	Demography Demography	Park and Ride Facilities	6	100%	0	0	Full Consensus
		Population Density	6	100%	0	0	Full Consensus
Political Variables							
Institutional Governance	Multidisiplinary Institutional	Lead institution (Full power)	5	83,3%	1	16,7%	Majority Consensus (Iteration)
	Inter-actor Collaboration and Cooperation	Trade-off of Interests	6	100%	0	0	Full Consensus
		Pelibatan multi sektor, multi level	6	100%	0	0	Full Consensus
	Political Stability	Policy Consistency *(Political Will)*	6	100%	0	0	Full Consensus
	Public Participation	Participation in Planning Process	6	100%	0	0	Full Consensus
		Participation in Implementation	6	100%	0	0	Full Consensus
		Participation in Monitoring and Evaluation	6	100%	0	0	Full Consensus
Policy and Regulation	Instruments for aligning actors' roles and authorities	-	6	100%	0	0	Full Consensus
	Policy Integration (Land Use & Transport)	-	6	100%	0	0	Full Consensus
	Policy Consistency	-	6	100%	0	0	Full Consensus
		Insentif	5	83,3%	1	16,7%	Majority Consensus (Iteration)

Indicator	Variable	Sub-Variable	Agreed		Disagreed		Conclusion
			f	%	f	%	
	Incentive and Disincentive Schemes	Disinsentif	6	100%	0	0	Full Consensus
	Zoning Regulations around Transit Areas	-	6	100%	0	0	Full Consensus
Funding and Financing	Funding Sources	-	6	100%	0	0	Full Consensus
	Financing Models	-	6	100%	0	0	Full Consensus

Based on Table 2, the Delphi analysis identified 20 variables and sub-variables that achieved full consensus, while five required further iteration. Most technical variables related to the 7D principles (Density, Diversity, Design, Destination Accessibility, Distance to Transit, Demand Management, and Demography) reached full consensus among stakeholders, as these are fundamental requirements in TOD implementation, as outlined in Ministerial Regulation ATR No. 16/2017. This underscores the necessity of aligning TOD planning with these indicators to ensure efficiency, sustainability, and seamless public transport integration. However, three technical variables, including Building Coverage Ratio (BCR), Housing Type, and Park & Ride did not achieve full consensus, alongside two political variables, there are multidisciplinary institutional governance and incentive mechanisms.

Several variables were rejected during stakeholder validation. Building Coverage Ratio (BCR) variable was contested, as land should be optimized, especially in TOD areas in Indonesia that are generally already developed. Alternative solutions, such as vertical gardens, were suggested for open green space. Rejection also occurred in the variable of housing type. Housing Type requirements under Ministerial Regulation ATR/BPN No. 16/2017 were deemed too restrictive, favoring high-rise buildings such as apartments and condominiums. Stakeholders argued that TOD policies should accommodate a diversified housing mix, including low-rise and mid-rise developments, particularly in areas subject to flight safety regulations (KKOP) or geotechnical constraints. Therefore, it is recommended to use a more flexible parameter, which is the diversification of housing types from landed to vertical housing. In addition, the park and ride variable was rejected due to misinterpreted as an absolute parameter in every TOD plan, without considering the context and location. In some cities, park and ride is actually allocated in the city centre, which contradicts the TOD principle of limiting private vehicles and strengthening public transport. Thus, a reassessment of its function, location, and necessity is recommended.

On institutional governance, the variable concerning the establishment of a new multidisciplinary lead institution was also contested. Stakeholders argued that establishing a new entity would be bureaucratically inefficient, adding administrative burdens and funding constraints. Instead, they recommended strengthening existing institutions through clear role allocation, regulatory enhancements, and cross-sector capacity building. Regarding incentives, stakeholders viewed them as unnecessary. Private investors tend to engage independently once TOD areas demonstrate strategic value in terms of functionality and accessibility, without requiring tax exemptions or financial compensations.

4.2. Exploration of Emerging Variables

In addition to the initially proposed indicators and variables, the stakeholder consultation process revealed three additional variables under two existing indicators. These new variables were considered relevant and important for the implementation of TOD development in Surabaya. These additions reflect contextual needs that were not accommodated in the initial variables.

Table 3 Stakeholder-proposed Variables

No.	Indiacator	New Variable	Operational Definition
1.	*Design*	Bicycle Lane	The availability of dedicated infrastructure in the form of lanes specifically designed for bicycle users.
2.	*Design*	Dedicated Bus Lane	The provision of exclusive lanes for public bus transport, physically separated from general motorized traffic.
3.	Policy and Regulation	Private Vehicle Restriction Policy	Traffic control regulations aimed at reducing private vehicle dependency and encouraging the shift to public or more sustainable modes of transport.

Three additional variables were proposed by stakeholders in response to contextual needs specific to the development of TOD areas in Surabaya. First, the inclusion of dedicated bicycle lanes within the design indicator emphasizes the need for safe and structured cycling infrastructure to enhance first and last mile connectivity while reducing reliance on motorized transport. Second, a dedicated bus lane variable was also added under the *design* indicator. Stakeholders argued that physically separated lanes for public buses can improve the reliability and efficiency of travel time, thereby encouraging for public transportation usage. Lastly, under the *policy and regulation* indicator, a new variable concerning private vehicle restriction policies was proposed. This variable refers to traffic management strategies aimed at reducing dependency on private vehicles and encouraging modal shifts toward public transport and active mobility modes such as walking and cycling, ultimately contributing to the overall performance of TOD areas.

4.3. Delphi Iteration Phase

The second round or iteration phase in the Delphi analysis served as a refinement process to consolidate stakeholder agreement on key variables influencing TOD implementation in Surabaya. The synthesis results indicate that the majority of stakeholders approved all variables, achieving full consensus across most categories. However, two variables—Building Coverage Ratio (BCR) and Housing Type reached only majority consensus, rather than unanimous or full consensus. This discrepancy arose due to one or more stakeholders consistently expressing disagreement with these specific variables.

Table 4 Level of Consensus and Level of Agreement for Iteration Phase

Indicator	Variable	Sub-Variable	Agreed		Disagreed		Conclusion
			f	%	f	%	
Site Characteristics	*Density*	Building Coverage Ratio (BCR)	5	83,3%	1	16,7%	Majority Consensus
		Housing Type	5	83,3%	1	16,7%	Majority Consensus
	Design	Bicycle Lane*	6	100%	0	0	Full Consensus
		Dedicated Bus Lane*	6	100%	0	0	Full Consensus
	Demand Management	Park & ride	6	100%	0	0	Full Consensus
Institutional Governance	Multidisciplinary Institutional	Lead institution (Full power)	6	100%	0	0	Full Consensus
Policy and Regulation	Incentive and Disincentive Schemes	Incentive	6	100%	0	0	Full Consensus
	Private Vehicle Restriction Policy*	-	6	100%	0	0	Full Consensus

*) Addition of new exploratory variables

The second round iteration of the Delphi analysis confirmed that most stakeholders agreed on the newly proposed variables, including dedicated bicycle lanes, exclusive bus lanes, and private vehicle restrictions as essential elements for TOD development in Surabaya. These additions reinforce sustainable mobility and strengthen public

transportation integration within TOD areas. Some variables displayed dynamic responses after further clarification and discussion with stakeholders. These included the park and ride variable, multidisciplinary lead institution, and the incentive regulation scheme. However, two variables, Building Coverage Ratio (BCR) and Housing Type only reached majority consensus, as one stakeholder consistently rejected them, citing the same concerns as in initial rounds.

4.4. Conclusion of Delphi Analysis

Through both the exploration and iterative phases, the Delphi process successfully reached consensus among all stakeholders. Both technical and political variables were validated as key considerations for TOD implementation in Surabaya City. In total, 43 sub-variables were finalized, classified under four indicators relevant to TOD development in Surabaya. These final variables are summarized in Table 3.

Table 3 Final Consensus Variables from the Delphi Analysis

Indicator	Variable	Sub-Variable	Code
Site Characteristics	*Density*	Building Coverage Ratio (BCR)	V1
		Floor Area Ratio (FAR)	V2
		Number of Floors	V3
		Housing Types	V4
		Minimum Residential Density	V5
		Targeted Number of Housing Units	V6
		Density Pattern	V7
	Diversity	Land Use Types	V8
		Residential and Non-Residential Ratio	V9
		Economic Activities	V10
	Design	Street frontage	V12
		Minimum Open Space	V13
		Block Dimension	V14
		Street Network Pattern	V15
		Bicycle Lane	V16
		Dedicated Bus Lane	V17
	Destination Accessibility	Availability of Public Transport	V18
	Distance to Transit	Distance to Transit Nodes	V19
	Demand Management	Maximum Parking for Residential Uses	V20
		Maximum Parking for Office Uses	V21
		Maximum Ground Floor Parking	V22
		Parking Pattern	V23
		Park and Ride Facilities	V24
	Demography	Population Density	V25
		Employment Density	V26
Institutional Governance	Multidisciplinary Institutional	Lead institution (Full power)	V27
	Inter-actor Collaboration and Cooperation	Trade-off of Interests	V28
		Multi-sector, multi-level engagement	V29
	Political Stability	Policy Consistency *(Political Will)*	V30
	Public Participation	Participation in Planning Process	V31
		Participation in Implementation	V32
		Participation in Monitoring and Evaluation	V33

Indicator	Variable	Sub-Variable	Code
Policy and Regulation	Instruments for aligning actors' roles and authorities	-	V34
	Policy Integration (Land Use & Transport)	-	V35
	Policy Consistency	-	V37
	Incentive and Disincentive Schemes	Incentive	V39
		Disincentive	V40
	Zoning Regulations around Transit Areas	-	V41
Funding and Financing	Funding Sources	-	V42
	Financing Models	-	V43

4.5. Discussion

The findings of this study highlight that the successful implementation of Transit-Oriented Development (TOD) in Surabaya requires consideration of both technical and political aspects. Using the Delphi method, consensus was reached on 43 sub-variables, reflecting key strategic factors in TOD planning. Most technical variables achieved full consensus, affirming the broad acceptance of 7D planning principles as fundamental guidelines, particularly due to their alignment with Ministerial Regulation ATR/BPN No. 16/2017. Technical suitability will be assessed within an 800-meter radius of major transit nodes.

Nonetheless, five variables required iteration to reach majority consensus, highlighting the need for contextual adaptation. For example, the Building Coverage Ratio (BCR) and Housing Type variables were not fully accepted, as stakeholders considered them overly normative and impractical, given local conditions such as existing development, height restrictions due to aviation safety zones (KKOP), and soil typologies. This underlines the importance of flexibility in interpreting national regulations for local implementation. A proposed alternative was the diversification of housing types—from landed houses to vertical housing—as a means of preserving original residents in new high-density areas and preventing social exclusion or gentrification, especially by maintaining housing affordability for lower- to middle-income groups (Ugenyi, 2011; Jones, 2023).

Furthermore, the inclusion of three additional variables—bicycle lanes, dedicated bus lanes, and private vehicle restrictions policies—reflects an increasing need for inclusive and sustainable mobility systems. Bicycle lanes, categorized under the design indicator, enhance connectivity and support first and last-mile transit accessibility (ITDP, 2017; Bhat et al., 2009; Eldeeb et al., 2021). The integration of dedicated bus lanes strengthens the TOD transport backbone, particularly Bus Rapid Transit (BRT), by reducing travel times and increasing reliability (Cervero, 2013). Meanwhile, private vehicle restrictions serve as a crucial policy mechanism, directly boosting public transit ridership through interventions such as Electronic Road Pricing (ERP), odd-even regulations, parking limitations, and road diets, are proven to reduce dependence on private cars and shift daily travel toward mass transit modes.

Prior studies (e.g., Griffiths & Curtis, 2017) emphasize that managing parking restrictions around transit nodes is one of key factor to reducing car use and increasing transit ridership. However, Clagget (2014) and Nahlik & Chester (2014) argue that reducing parking can influence behavior—encouraging walking, cycling, and transit use—parking policies must be carefully balanced, particularly in commercial areas, to avoid harming economic viability. Mobility choices are shaped not only by urban design but also by behavioral patterns. Therefore, reducing car dependency requires not only spatial interventions but also behavioral strategies that support sustainable modal shifts.

Politically, the incentive scheme and the establishment of a multidisciplinary lead institution faced mixed responses due to bureaucratic challenges and institutional capacity limitations. A positive dynamic emerged during the iteration process, some stakeholders changed their stance to agreement after further discussion and clarification. Prior research underlines the importance of clear incentive or disincentive mechanisms to encourage private-sector participation in TOD development (Tan et al., 2014; Mungkasa, 2023). The World Bank (2003) also

highlights the challenge governments face in formulating the right incentives to attract private investment while minimizing financial risks. However, Mungkasa (2023) notes that in BRT-based TOD, direct financial incentives may not be necessary, as developers often value streamlined permitting or rezoning processes, due to time being a critical factor in financial feasibility. Therefore, Surabaya's municipal government must clearly define the structure of TOD incentives, whether through financial subsidies, tax reductions, or intensity bonuses such as increased Floor Area Ratio (FAR).

Regarding institutional governance, a multidisciplinary TOD operator is seen as critical factor for successful implementation. Reflecting on the TOD experience in India, while the central government provides policy frameworks, incentives, and partial funding, local governments often lack the technical and managerial capacity to coordinate among agencies, leading to conflicts of interest Ramulu, et al. (2021). An umbrella institution with sufficient authority bridge institutional gaps, coordinate actors, eliminate overlapping responsibilities, and ensure sufficient budget allocation for integrated public transportation systems.

Additionally, Surabaya's TOD planning should not be limited to the city's administrative boundaries. As a metropolitan area, Surabaya's mobility patterns extend beyond its urban boundaries to include regional movements within Gerbangkertasusila. Thus, TOD planning must incorporate intensive coordination with provincial and national authorities, particularly for determining backbone transit modes, such as rail, BRT, or intercity mass transport systems. Ideally, the future TOD operator should have regional level authority, at least covering Gerbangkertasusila, to effectively facilitate spatial and functional integration across municipalities.

5. Conclusion and Recommendations

Transit-Oriented Development (TOD) refers to a strategic urban planning concept that promotes the integration of land use and public transportation systems to foster compact, well-connected, and environmentally sustainable urban areas. The findings of this study highlight that the successful implementation of Transit-Oriented Development (TOD) in Surabaya requires consideration of both technical and political aspects. Using the Delphi method, consensus was reached on 43 sub-variables, reflecting key strategic factors in TOD planning.

This study highlights that the implementation of Transit-Oriented Development (TOD) in Surabaya requires an integrated approach that considers both technical and political aspects, including spatial suitability, institutional capacity, regulatory coherence, and financial support systems. The findings emphasize the need for a collaborative strategy that not only adheres to technical standards but also fosters cross-sectoral alignment and prioritizes the broader public interest.

To enhance the implementation of Transit-Oriented Development (TOD) in Surabaya, several key actions should be prioritized. First, regulatory alignment must be strengthened by integrating land use and transport policies, ensuring consistency with Ministerial Regulation ATR/BPN No. 16/2017 and adapting them to local conditions. Additionally, institutional coordination should be reinforced through clear inter-agency collaboration mechanisms, preventing bureaucratic inefficiencies while facilitating cross-sector partnerships among government entities, private developers, and urban planners. Furthermore, TOD developments should prioritize inclusive mobility, incorporating pedestrian pathways, dedicated bicycle lanes, and well-integrated public transit nodes to enhance accessibility and reduce private vehicle dependence. Another crucial aspect is the promotion of adaptive housing policies that encourage mixed-income residential strategies, preventing gentrification and ensuring affordability for middle- and lower-income groups within TOD areas.

From a political-institutional perspective, the establishment of a multidisciplinary TOD operator should ideally be positioned at the regional level rather than the city scale. This entity should not be part of the formal government, but rather a corporate body or enterprise-based institution, allowing for greater flexibility in TOD development management and accelerating its implementation. While from a financial standpoint, establishing sustainable funding mechanisms is crucial. This involves a blend of public investment, private sector incentives, and value capture strategies, ensuring TOD infrastructure is both financially viable and effectively integrated. A robust planning and regulatory framework plays a vital role in ensuring TOD projects are not only comprehensively designed, but also developed and maintained consistently throughout their implementation.

However, this study has certain limitations. While it successfully identifies critical variables for implementing TOD, it has not yet incorporated perspectives from private sector actors or the community members, who are key participants in TOD planning and implementation. Without incorporating their needs, preferences, and concerns, TOD planning strategies or policies may fail in implementation proccess.

This study successfully identifies key variables influencing the implementation of Transit-Oriented Development (TOD), providing a structured framework that highlights both technical and political factors essential for its development. The findings serve as a foundation for further research exploring the role of political variables in facilitating technical aspects of TOD in specific urban contexts, particularly examining how policy frameworks, institutional arrangements, and financing mechanisms impact TOD effectiveness. Future studies are recommended to conduct an in-depth analysis of the effectiveness of incentive strategies for private sector participation, the impact of regulatory adjustments on TOD implementation flexibility, and comparative studies across different metropolitan areas to identify success patterns and adaptable solutions. Additionally, case-based research on stakeholder interactions within TOD planning and governance, including the responses of private investors and the general public to TOD policies, would provide valuable insights into adaptive and sustainable implementation models.

References

Abdi, M. H., & Lamíquiz-Daudén, P. J. (2022). Transit-oriented development in developing countries: A qualitative meta-synthesis of its policy, planning and implementation challenges. *International Journal of Sustainable Transportation*, *16*(3), 195–221. https://doi.org/10.1080/15568318.2020.1858375

Adiyatma, I., & Heliati, R. R. (2018). *Modul Metode Delphi*. Bandung: Universitas Padjajaran.

Alexander. (2007). Institutionalist Perspective on Planning: Why, Where? How? In *Institutions and Planning*. Amsterdam.

Anderson, A., & Forbes, S. (2011). 2010 inventory of TOD programs : a national review of state, regional and local programs that fund transit-oriented development plans and projects, (January). Diambil dari http://ctod.org/ra/2010_Inventory_of_State_Regional_Local_TOD_Programs.pdf

Ayuningtias, S. H., & Karmilah, M. (2019). Penerapan Transit Oriented Development (Tod) Sebagai Upaya Mewujudkan Transportasi Yang Berkelanjutan. *Pondasi*, *24*(1), 45. https://doi.org/10.30659/pondasi.v24i1.4996

Az-zahra, A. (2020). Aksesibilitas Kawasan Transit Oriented Development Di Kota Surabaya Dengan Pendekatan Waktu Perjalanan (Studi Kasus: Terminal Joyoboyo).

Bajracharya, B., Khan, S., & Longland, M. (2005). Regulatory and incentive mechanisms to implement transit oriented development (tod) in south east Queensland. *Proceedings of the 2nd Bi-Annual National Conference on the State of Australian Cities*, *Infrastruc*(09).

Bank, W. (2003). *Sustainable Development in a Dynamic World*. Washington DC: Copublication of The World Bank and Oxford University Press.

Belzer, D., & Autler, G. (2002). TRANSIT ORIENTED DEVELOPMENT: MOVING FROM RHETORIC TO REALITY A Discussion Paper Prepared for The Brookings Institution Center on Urban and Metropolitan Policy and The Great American Station Foundation, (June).

Bhagwati, P., & Kumar, M. (2024). Transit-Oriented Development: Learnings from Global Examples. *LOGI - Scientific Journal on Transport and Logistics*, *15*(1), 1–12. https://doi.org/10.2478/logi-2024-0001

Bhat, C. R., Sen, S., & Eluru, N. (2009). The impact of demographics, built environment attributes, vehicle characteristics, and gasoline prices on household vehicle holdings and use. *Transportation Research Part B: Methodological*, *43*(1), 1–18. https://doi.org/10.1016/j.trb.2008.06.009

Calthorpe, P. (1993). *The Next American Metropolis*. New York: Princeton Architectural Press.

Cervero. (2004). *Transit-oriented development in the United States: Experiences, challenges, and prospects.*

Cervero, R. (2013). An Efficient and Competitive Mode of Public Transport D E C E M B E R 2 0 1 3 15:37 Content, (December), 1–36.

Cervero, R., & Dai, D. (2014). BRT TOD: Leveraging transit oriented development with bus rapid transit investments. *Transport Policy*, *36*, 127–138. https://doi.org/10.1016/j.tranpol.2014.08.001

Cervero, R., & Kockelman, K. (1997). Travel demand and the 3Ds: Density, diversity, and design. *Transportation Research Part D: Transport and Environment*, *2*(3), 199–219. https://doi.org/10.1016/S1361-9209(97)00009-6

CERVERO, R., MURPHY, S., FERRELL, C., GOGUTS, N., TSAI, Y.-H., ARRINGTON, G. B., … WITENSTEIN, N. (2004). *Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects*. *Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects* (TCRP Repor). Transportation Research Board. https://doi.org/10.17226/23360

Clagget, M. T. (2014). If It's not Mixed-income, It won't be Transit-Oriented: Ensuring Our Fugure Developments are Equitable and Promote Transit. *Transportation Law Journal*, *1*(41), 0–32.

Clark, P. B., & Wilson, J. Q. (1961). Incentive Systems: A Theory of Organizations, *6*(2), 129–166.

Curtis, C. (2012). Transitioning to Transit-Oriented Development: The Case of Perth, Western Australia. *Urban Policy and Research*, *30*(3), 275–292. https://doi.org/10.1080/08111146.2012.665364

Curtis, C., Renne, J. L., & Bertolini, L. (2009). *Transit Oriented Development: Making it Happen*. Ashgate Publishing Limited.

Dirgahayani, P., Yesuari, A. P., Wulansari, T. R., & Sutanto, H. (2020). The formation of network governance in accelerating the implementation of TOD: The case of Jakarta MRT Phase 1, Indonesia. *Case Studies on Transport Policy*, *8*(4), 1412–1425.

https://doi.org/10.1016/j.cstp.2020.10.006
Dittmar, H., Belzer, D., & Autler, G. (2004). An Introduction to Transit-Oriented Development. In *The New Transit Town: Best Practices In Transit-Oriented Development* (hal. 259). Washington DC: Island Press-Center for Resource Economics.
Dittmar, H., & Ohland, G. (2004). *THE NEW TRANSIT TOWN: BEST PRACTICES IN TRANSIT-ORIENTED DEVELOPMENT*. Island Press. Diambil dari http://worldcat.org/isbn/1559631171
Dorsey, B., & Mulder, A. (2013). Planning, place-making and building consensus for transit-oriented development: Ogden, Utah case study. *Journal of Transport Geography*, *32*, 65–76. https://doi.org/10.1016/j.jtrangeo.2013.08.010
du Plessis, E., & Human, S. P. (2007). REVIEW THE ART OF THE DELPHI TECHNIQUE : HIGHLIGHTING ITS SCIENTIFIC MERIT Dr Emmerentia du Plessis. *Health Sa Gesondheid*, *12*(4), 13–24.
Dunphy, R., Myerson, D., & Pawlukiewicz, M. (2003). *Ten Principles for Successful Development Around Transit*.
Eldeeb, G., Mohamed, M., & Páez, A. (2021). Built for active travel? Investigating the contextual effects of the built environment on transportation mode choice. *Journal of Transport Geography*, *96*(August). https://doi.org/10.1016/j.jtrangeo.2021.103158
Ewing, R., & Cervero, R. (2010). Travel and the built environment. *Journal of the American Planning Association*, *76*(3), 265–294. https://doi.org/10.1080/01944361003766766
Fatmawati, Y. G. (2022). Pengembangan Transportasi Berkelanjutan untuk Mewujudkan Konsep TOD sebagai Pengentas Permasalahan Perkotaan di Kota Surabaya. *Journal of Education, Humaniora and Social Sciences (JEHSS)*, *5*(2), 958–965. https://doi.org/10.34007/jehss.v5i2.1335
Gabbe, C. J., Manville, M., & Osman, T. (2021). The opportunity cost of parking requirements: Would silicon valley be richer if its parking requirements were lower? *Journal of Transport and Land Use*, *14*(1), 277–301. https://doi.org/10.5198/jtlu.2021.1758
Greenberg, E. (2004). REGULATIONS SHAPE REALITY: ZONING FOR TRANSIT-ORIENTED DEVELOPMENT. In *THE NEW TRANSIT TOWN: BEST PRACTICES IN TRANSIT-ORIENTED DEVELOPMENT*. Island Press.
Griffiths, B., & Curtis, C. (2017). Effectiveness of Transit Oriented Development in Reducing Car Use: Case Study of Subiaco, Western Australia. *Urban Policy and Research*, *35*(4), 391–408. https://doi.org/10.1080/08111146.2017.1311855
Handayeni, K. D. M. E., & Ariastita, P. G. (2014). KEBERLANJUTAN TRANSPORTASI DI KOTA SURABAYA MELALUI PENGEMBANGAN KAWASAN BERBASIS TOD (Transit Oriented Development) Adopting TOD (Transit Oriented Development)for Sustainable Transportation in Surabaya City. *Tata Loka*, *16*(2), 108–115. Diambil dari file:///C:/Users/Iqbal Pratama/Downloads/248-338-1-SM (4).pdf
Hendrigan, C. (2020). *A Future of Polycentric Cities*. *A Future of Polycentric Cities*. https://doi.org/10.1007/978-981-13-9169-9
Humphrey-Murto, S., Varpio, L., Wood, T. J., Gonsalves, C., Ufholz, L. A., Mascioli, K., … Foth, T. (2017). The Use of the Delphi and Other Consensus Group Methods in Medical Education Research: A Review. *Academic Medicine*, *92*(10), 1491–1498. https://doi.org/10.1097/ACM.0000000000001812
Ibraeva, A., Correia, G. H. de A., Silva, C., & Antunes, A. P. (2020). Transit-oriented development: A review of research achievements and challenges. *Transportation Research Part A: Policy and Practice*, *132*(October 2019), 110–130. https://doi.org/10.1016/j.tra.2019.10.018
ITDP (Insitute for transportation and development Policy). (2017). TOD Standard 3.0 ITDP. *Angewandte Chemie International Edition, 6(11), 951–952.*, (Mi), 5–24.
Jones, C. E. (2023). Transit-Oriented Development and Suburban Gentrification: A “Natural Reality” of Refugee Displacement in Metro Vancouver. *Housing Policy Debate*, *33*(3), 533–552. https://doi.org/10.1080/10511482.2020.1839935
Masyithah, A. J., -, S., & Handayeni, K. D. M. E. (2021). Penerapan Konsep Transit Oriented Development Dalam Pengembangan Kawasan Jembatan Merah Surabaya. *Desa-Kota*, *3*(2), 148. https://doi.org/10.20961/desa-kota.v3i2.43892.148-161
Mu, R., & de Jong, M. (2016). A network governance approach to transit-oriented development: Integrating urban transport and land use policies in Urumqi, China. *Transport Policy*, *52*, 55–63. https://doi.org/10.1016/j.tranpol.2016.07.007
Mudzaki, Y., Firdausiyah, N., & Agustin, I. W. (2023). PENERAPAN KONSEP TRANSIT ORIENTED DEVELOPMENT (TOD) DI KAWASAN STASIUN GUBENG, KOTA SURABAYA. *Planning for Urban Region and Environment Journal (PURE)*, *12*(April 2023), 215–226.
Mungkasa, O. (2023). Mewujudkan Transit Oriented Development (TOD) di Indonesia. Rangkuman Pembelajaran Kota Mancanegara, (April), 1–29. Diambil dari https://www.researchgate.net/publication/369825420
Nadyla, A., & Nurlaela, S. (2019). Pengukuran Tingkat Keseimbangan Node dan Place di Kawasan Transit Oriented Development (TOD) Terminal Joyoboyo, Surabaya. *Jurnal Transportasi: Sistem, Material, dan Infrastruktur*, *1*(2), 100. https://doi.org/10.12962/j26226847.v1i2.5034
Nahlik, M. J., & Chester, M. V. (2014). Transit-oriented smart growth can reduce life-cycle environmental impacts and household costs in Los Angeles. *Transport Policy*, *35*, 21–30. https://doi.org/10.1016/j.tranpol.2014.05.004
Newton, P. W. (2010). Beyond greenfield and brownfield: The challenge of regenerating Australia’s greyfield suburbs. *Built Environment*, *36*(1), 81–104. https://doi.org/10.2148/benv.36.1.81
Nurlaela, S., Nadyla, A., Zuhdi, A. Y., Handayeni, K. D. M. E., Fakhrianto, I., Nurkhariza, A. R., & Yusuf, L. (2019). Qualitative comparative assessment by fsQCA for Transit Oriented Development (TOD) area comparison. *IOP Conference Series: Earth and Environmental Science*, *340*(1). https://doi.org/10.1088/1755-1315/340/1/012037
Ollivier, G., Ghate, A., Bankim, K., & Mehta, P. (2021). *TRANSIT – ORIENTED DEVELOPMENT IMPLEMENTATION RESOURCES & TOOLS*. Washington DC: World Bank.
PT Sarana Multi Infrastruktur (Persero). (2019). SMI Insight-Transit-Oriented Development Q4-2019, 1–11. Diambil dari https://www.jakartamrt.co.id/2017/12/02/sulap-dukuh-atas-jadi-tod-berkelas-mrt-jakarta-sewa-konsultan-asal/;
Ramulu, D. S., Sankar, K., & Randhawa, A. (2021). Challenges of Transit Oriented Development (TOD) in Indian Cities. *Institute of Town Planners, India Journal*, *2*(Special Issue), 35–46. https://doi.org/10.13140/RG.2.2.35660.13444
Renne, J. (2008). Smart Growth and Transit-Oriented Development at the State Level: Lessons from California, New Jersey, and Western Australia. *Journal of Public Transportation*, *11*(3), 77–108. https://doi.org/10.5038/2375-0901.11.3.5

Roberts, M., Gil Sander, F., & Tiwari, S. (2019). *Time to ACT: Realizing Indonesia's Urban Potential*. *Time to ACT: Realizing Indonesia's Urban Potential*. https://doi.org/10.1596/978-1-4648-1389-4

Rosalin, A., Kombaitan, B., Zulkaidi, D., Dirgahayani, P., & Syabri, I. (2019). Towards Sustainable Transportation: Identification of Development Challenges of TOD area in Jakarta Metropolitan Area Urban Railway Projects. *IOP Conference Series: Earth and Environmental Science*, *328*(1). https://doi.org/10.1088/1755-1315/328/1/012006

Roseland, M. (2005). *Towards Sustainable Communities*. *Sustainable Communities: The Potential for Eco-Neighbourhoods*. https://doi.org/10.4324/9781315870649-31

Salat, S., & Ollivier, G. (2017). Transforming the Urban Space through Transit-Oriented Development The 3V Approach MDTF Sustainable Urbanization. Diambil dari www.worldbank.org

Singh, Y. J. (2015). *Measuring Transit-Oriented Development (Tod) At Regional and Local Scales – a Planning Support Tool*. *Dissertation*.

Suzuki, H., Cervero, R., & Iuchi, K. (2013). *Transforming cities with transit: Transit and land-use integration for sustainable urban development*. Washington DC: World Bank. https://doi.org/10.1596/978-0-8213-9745-9

Tack, J., Boardman, H., Layer, P., Schiefke, I., Jayne, D., Scarpignato, C., … Mohr-Drewes, A. (2017). An expert consensus definition of failure of a treatment to provide adequate relief (F-PAR) for chronic constipation – an international Delphi survey. *Alimentary Pharmacology and Therapeutics*, *45*(3), 434–442. https://doi.org/10.1111/apt.13874

Tan, W., Bertolini, L., & Janssen-Jansen, L. B. (2011). Paper Presented in Track 11(Transportation, Infrastructure & Planning) at the 3, *11*(July), 4–8.

Tan, W. G. Z., Janssen-Jansen, L. B., & Bertolini, L. (2014). The Role of Incentives in Implementing Successful Transit-Oriented Development Strategies. *Urban Policy and Research*, *32*(1), 33–51. https://doi.org/10.1080/08111146.2013.832668

Thomas, R., & Bertolini, L. (2014). Beyond the Case Study Dilemma in Urban Planning: Using a Meta-matrix to Distil Critical Success Factors in Transit-Oriented Development. *Urban Policy and Research*. Taylor & Francis. https://doi.org/10.1080/08111146.2014.882256

Thomas, R., Pojani, D., Lenferink, S., Bertolini, L., Stead, D., & van der Krabben, E. (2018). Is transit-oriented development (TOD) an internationally transferable policy concept? *Regional Studies*, *52*(9), 1201–1213. https://doi.org/10.1080/00343404.2018.1428740

Ugenyi, C. (2011). DISPLACEMENT DUE TO GENTRIFICATION: MITIGATION STRATEGIES. *Georgia Institute of Technology*.

Wang, F., Wu, W., & Wang, D. (2023). Emerging evidence on transit-oriented development in the Global South. *Transportation Research Part D: Transport and Environment*, *123*(September). https://doi.org/10.1016/j.trd.2023.103898

Witkins, B. (1984). *Assessment Needs in Educational and Social Programs*. San Fransisco: Jossey-Bass Publisher.

WSP. (2020). *Transit-Oriented Development*. Montreal, Quebec.